TITLE OF THE INVENTION

Receiver Having a Preset Tuner

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a receiver having a preset tuner and, more particularly, to a receiver which counts the number of receivable channels in order to determine whether within a terrestrial-wave television broadcast channel plan or within a CATV broadcast channel plan.

Description of the prior art

The receivers of this kind are disclosed, for example, in Japanese Patent Laid-open No. 87415/1995 [H04N5/44, 7/16] laid open on March 31, 1995, U.S. Pat. No. 4,776,038, Japanese Patent Laid-open No. 184301/2000 [H04N5/44, 5/02, 7/18] laid open on June 30, 2000, and so on. These prior arts, in any, can determine whether within a CATV channel plan by the detection of a presence of (a plurality of) particular CATV channels, in the automatic determination whether within a terrestrial-wave television broadcast (hereinafter, referred merely to as "TV" or "TV broadcast") or within a CATV broadcast.

The prior arts, however, are nothing more than counting the number of receivable channels from among particular CATV channels wherein spuriousness or ghost is not taken into consideration. That is, where many channels are present, there exist a case that the sum or difference frequency of or between particular two stations be fallen under and received by the broadcast station (ghost) having a certain frequency range or that incorrect reception results due to spurious reception. In the prior arts, there has been a possibility of incurring miscounting, possibly resulting in incorrect determination.

Furthermore, the present applicant has proposed, in Japanese Utility Model

Registration Non. 3068428 issued on May 12, 2000, a novel method for determining to resolve the foregoing problem. The proposed method is to determine as to whether the channel frequency of each reception channel is within a certain frequency range about the center frequency, wherein if within a predetermine frequency range, it is counted as a receivable channel.

This proposed method certainly reduces miscounting caused due to ghost or spuriousness but cannot preclude such miscounting thoroughly.

SUMMARY OF THE INVENTION

Therefore, it is a primary object of the present invention to provide a receiver having a preset tuner capable of determining a correct channel plan.

A receiver according to the present invention is a receiver which conducts search within a first frequency range with respect to a center frequency of each channel to register received data into a memory and counts the number of receivable channels thereby determining whether within a terrestrial-wave television broadcast channel plan or within a CATV broadcast channel plan, comprising: frequency setting means for setting a second frequency range narrower than the first frequency range; and determining means for determining whether within a terrestrial-wave television broadcast or within a CATV broadcast by counting the number of received channels in the second frequency range.

Incidentally, the first frequency range is ± approx. 2 MHz of the center frequency while the second frequency range is ± approx. 200 kHz of the center frequency.

Also, when counting the number of receivable channels of CATV broadcasts in a UHF band overlapped with television channels, a third frequency range may be set that is removed of a range of ± approx. 200 kHz about the center frequency + 2MHz. In this

case, because the frequency range of the center frequency + 2MHz ± approx. 200 kHz is excluded, it is possible to completely avoid miscounting in that frequency range.

When carrying out preset registration, search is first made for the presence or absence of receivable channels in the first frequency range. If there is a receivable channel, reception data (center frequency, etc.) is registered. If the reception channel is a TV channel, filtering is made to count only the channels existing in a range of the center frequency ± approx. 200 kHz. If it is a CATV channel, counting is only for the channels existing in the range of the center frequency ± approx. 200 kHz and, in the channel in a UHF band, a filtering process is carried out that removes of the channels in the range of the center frequency + 2MHz ± approx. 200 kHz.

According to this invention, because the channels received due to spuriousness, ghost or images are excluded in counting receivable channels, receivable channels can be correctly counted. Thus, a TV channel plan or a CATV channel plan can be accurately determined and set.

The above described objects and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram showing a television receiver according to an embodiment of the present invention;

Figure 2 is a flowchart showing preset operation in the Figure 1 embodiment;

Figure 3 is a table exemplifying an actual channel plan including a North American standard, HRC, IRC and Canadian Offset;

Figure 4 is an illustrative view showing a first filter process for TV; and

Figure 5 is an illustrative view showing a second filter process for CATV.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodied of a receiver 10 shown in Figure 1 includes an input terminal 12. To this input terminal 12 is connected a television antenna 14 through a distributor 16 or directly with a CATV cable terminal 18. Consequently, the input terminal 12 receives a television broadcast signal or a CATV broadcast signal. The broadcast signal is supplied through the input terminal 12 to a tuner 20. The tuner 20 converts the received broadcast signal into an intermediate frequency signal and outputs it to an IF amplifier 22. The intermediate frequency signal from the IF amplifier 22 is sent to a waveform detector 24. Hence, a television signal is outputted from the waveform detector 24.

The television signal is delivered to a synchronization detecting circuit 26. The synchronization detecting circuit 26, when detecting a synchronizing signal contained in the television signal, supplies a detection signal to a CPU 28. The CPU 28 cooperates with a ROM 30 and RAM 32 to configure a microcomputer or microprocessor, to receive an AFT (Automatic Fine Tuning) voltage from the foregoing waveform-detector 24. Accordingly, the CPU 28 can determine from the AFT voltage whether tuned to a desired channel of television broadcast or CATV broadcast. Incidentally, the ROM 30 constituting a microcomputer is previously written with a table of frequency allotment. Meanwhile, the RAM 32 stores a result of channel selection. The CPU 28 controls a channel selector 34 on the basis of a signal from the synchronization detection circuit 26 and AFT voltage as well as information of ROM 30. The channel selector 34 converts the control data from the CPU 28 into a tuning signal and applies it to a tuner 20 (local oscillation circuit thereof, not shown). Incidentally, in recent years, the channel selectors of this kind frequently use PLL circuits, and detailed explanation is hence omitted.

The CPU 28 is also coupled with a keyboard 36. This keyboard 36 includes a ten key 36a to allow a user to manually input a channel number, and an up-down key 36b for the user to operate in controlling channels and/or volume. When the user operates the ten key 36a to input a channel number, the CPU 28 provides the channel selector 34 with frequency band data and frequency data for the channel number. Consequently, the channel selector 34 applies to the tuner 20 a band select signal according to the frequency band data and a frequency control signal, or tuning voltage, depending upon the frequency data. This allows the user to view a channel as desired. At this time, the CPU 28 searches for a center frequency for the user-input channel number and a frequency range within a first frequency range (usually, approx. $\pm$ 2 MHz) including the center frequency.

Referring to Figure 2, explanation will be made on the preset operation in the Figure 1 embodiment. At a first step S1, the CPU 28 supplies a control signal to the tuner 20 by way of the channel selector 34, to carry out search operation. In the process of search, if the CPU 28 receives a proper AFT voltage value from the waveform detector 24 or a signal representative of the presence of a synchronization signal from the synchronization detecting circuit 26, this means a reception of a television broadcast. The CPU 28 registers the reception data (reception frequency, channel, etc.) into the RAM 32. As for the reception data, various forms may be considered including data representative of reception frequency, difference from the center frequency, etc. As for the channel, various ways are to be considered including channel No. per se, substitutive use of a memory address for storing data, etc.

Thereafter, in step S3, a first filter process is carried out.

In the North America, as shown in Figure 3, the frequencies are assigned for each channel as concerned with HRC, IRC and Canadian Offset, besides the US Standard. In

the Canadian Offset, there is a channel having a frequency set 1 MHz lower than that of the US Standard. Also, in HRC as a cable channel, the frequencies of channel 5 and channel 6 are set 0.75 MHz higher than the US Standard and the other channels have frequencies set 1.25 MHz lower than that. In the IRC as a cable channel, the frequencies of channel 5 and channel 6 are set 2 MHz higher and the frequency of the other channels are set same as those of the US Standard.

From the calculation of the image frequency about the center frequency on all the channels under the US Standard, HRC, IRC or Canadian Offset, it has been revealed that there exist no image frequencies in a range of nearly ± 200 kHz of a channel center frequency. On the contrary, there is a possibility that image frequency exist in a region beyond a range of ± 250 kHz of the center frequency.

Accordingly, in this embodiment, filtering is made in order to count receivable channels existing only within a frequency range of approximately ± 200 kHz of the center frequency. This allows for avoidance from incorrect determination due to counting image frequencies as channel reception.

The counting, in this case, means counting for determination of TV or CATV. The data of channels out of the count condition is not erased, i.e., the data is left in the memory. However, after the completion of determination, any of the data on a TV channel plan or CATV channel plan will be saved in the memory.

Considering the UHF band being not shown in Figure 3, TV channels 14 is at 471.25 MHz while CATV channel 65 is at 469.25 MHz. That is, the TV channel 14 exists 2 MHz above the frequency of CATV channel 65. Particularly, in an urban region, where broadcast is implemented within a service area of a greater-powered station by a smaller-powered local station utilizing the UHF radio-wave directivity, TV-channel continuity will occur that is not to be allowed in nature. That is, two receivable channels

would exit continuously within a region that the greater-powered station has a radio wave as weak as almost the radio wave of a local station. On the other hand, upon establishing a CATV channel plan, there is a case of employing a technique of establishing after finally confirming "channel continuity". In this case, there is a need of excluding the possibility of counting a TV channel when counting CATV receivable channels.

In this embodiment, it is determined in step S4 whether TV channel or CATV channel. If CATV channel, in step S5 a second filtering process as shown in Figure 5 is carried out. That is, counting is only for the receivable channels existing within the range of approximately ±200 kHz around the CATV-channel center frequency. Furthermore, in the UHF band is excluded a frequency range of a center frequency + 2 MHz ±approx. 200 kHz. Incidentally, it is to be easily understood that the center frequency + 2 MHz is on the ground of the frequency difference between adjacent channels of TV and CATV in the UHF band. Even if continuity occurs between the UHF broadcast stations in such a big city as mentioned above, the filter process of this step S5 delimits it to TV. This eliminates the possibility of incorrect determination as CATV.

After the filtering process of the steps S4 and S5 in this manner, in step S6 the respective number of receivable channels as TV and CATV are counted by the counters formed in a proper area of the RAM 32.

It is then determined in step S7, according to a count value of the counter, whether within a TV channel plan or CATV channel plan. If "YES" is determined in the step S7, in step S8 preset registration is carried out according to the TV channel plan. If "NO" in step S9, preset registration is carried out according to the CATV plan.

In this manner, when determining to adopt a TV plan or a CATV plan depending upon the number of receivable channels, preset registration can be correctly done according to a correct channel plan if miscounting due to spuriousness, ghost or images is

avoided. The preset registration, in this case, refers to transfer of data into a predetermined address space of a memory according to a determination result.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.